

C L A I M S

1. A method for lysing cellulite comprising the steps of:
directing focused ultrasonic energy at a target volume in a region of a
body containing cellulite ; and
5 modulating said focused ultrasonic energy so as to selectively lyse said
cellulite in said target volume and generally not lyse non-cellulite tissue in said target
volume.
2. A method for lysing cellulite according to claim 1 and wherein said
10 directing focused ultrasonic energy generally prevents lysis of tissue outside of said
target volume.
3. A method for lysing cellulite according to claim 1 or claim 2 and also
comprising:
15 ultrasonic imaging of said region at least partially concurrently with said
directing focused ultrasonic energy at said target volume.
4. A method for lysing cellulite according to any of the preceding claims
and wherein said directing comprises positioning at least one ultrasonic transducer
20 relative to said body in order to direct said focused ultrasonic energy at said target
volume.
5. A method for lysing cellulite according to any of claims 1 to 3 and
wherein said directing comprises varying the focus of at least one ultrasonic transducer
25 in order to direct said focused ultrasonic energy at said target volume.
6. A method for lysing cellulite according to claim 5 and wherein said
varying the focus comprises changing the volume of said target volume.
- 30 7. A method for lysing cellulite according to claim 5 and wherein said
varying the focus comprises changing the distance of said target volume from said at
least one ultrasonic transducer.

8. A method for lysing cellulite according to any of the preceding claims and also comprising sensing ultrasonic energy coupled to an external surface of said body adjacent said target volume.

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9. A method for lysing cellulite according to any of the preceding claims and also comprising sensing of cavitation at said target volume.

10. A method according to any of the preceding claims and wherein said directing takes place from an ultrasonic transducer located outside of the body.

11. A method according to any of the preceding claims and wherein said directing takes place to a target volume bounded by dermis and fascia.

12. A method according to any of the preceding claims and wherein said ultrasonic energy has a frequency in a range of 50 KHz - 1000 KHz.

13. A method according to any of the preceding claims and wherein said ultrasonic energy has a frequency in a range of 100 KHz - 500 KHz.

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14. A method according to any of the preceding claims and wherein said ultrasonic energy has a frequency in a range of 150 KHz - 300 KHz.

15. A method according to any of the preceding claims and wherein said modulating provides a duty cycle between 1:2 and 1:50.

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16. A method according to any of the preceding claims and wherein said modulating provides a duty cycle between 1:5 and 1:30.

17. A method according to any of the preceding claims and wherein said modulating provides a duty cycle between 1:10 and 1:20.

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18. A method according to any of the preceding claims and wherein said modulating provides between 2 and 1000 sequential cycles at amplitude above a cavitation threshold.

19. A method according to any of the preceding claims and wherein said modulating provides between 25 and 500 sequential cycles at amplitude above a cavitation threshold.

20. A method according to any of the preceding claims and wherein said modulating provides between 100 and 300 sequential cycles at amplitude above a cavitation threshold.

21. A method according to any of the preceding claims and wherein said modulating comprises modulating the amplitude of said ultrasonic energy over time.

22. A method for lysing cellulite comprising the steps of:
generating, at a source outside a body, ultrasonic energy which selectively generally lyses cellulite and generally does not lyse non-cellulite tissue; and
directing said ultrasonic energy, from said source outside said body, at a target volume in a region of said body containing cellulite .

23. A method for lysing cellulite according to claim 22 and wherein said directing said ultrasonic energy generally prevents lysis of tissue outside of said target volume.

24. A method for lysing cellulite according to claim 22 or claim 23 and also comprising:

ultrasonic imaging of said region at least partially concurrently with said directing said ultrasonic energy at said target volume.

25. A method for lysing cellulite according to any of claims 22 to 24 and wherein said directing comprises positioning at least one ultrasonic transducer relative

to said body in order to direct said ultrasonic energy at said target volume.

26. A method for lysing cellulite according to any of claims 22 to 24 and wherein said directing comprises varying the focus of at least one ultrasonic transducer in order to direct said ultrasonic energy at said target volume.

27. A method for lysing cellulite according to claim 26 and wherein said varying the focus comprises changing the volume of said target volume.

28. A method for lysing cellulite according to claim 26 and wherein said varying the focus comprises changing the distance of said target volume from said at least one ultrasonic transducer.

29. A method for lysing cellulite according to any of claims 22 to 28 and also comprising sensing ultrasonic energy coupled to an external surface of said body adjacent said target volume.

30. A method for lysing cellulite according to any of claims 22 to 28 and also comprising sensing of cavitation at said target volume.

31. A method according to any of claims 22 to 30 and wherein said ultrasonic energy has a frequency in a range of 50 KHz - 1000 KHz.

32. A method according to any of claims 22 to 30 and wherein said ultrasonic energy has a frequency in a range of 100 KHz - 500 KHz.

33. A method according to any of claims 22 to 30 and wherein said ultrasonic energy has a frequency in a range of 150 KHz - 300 KHz.

34. A method according to any of claims 22 to 33 and also comprising modulating said ultrasonic energy wherein said modulating provides a duty cycle between 1:2 and 1:50.

35. A method according to any of claims 22 to 33 and also comprising modulating said ultrasonic energy wherein said modulating provides a duty cycle between 1:5 and 1:30.

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36. A method according to any of claims 22 to 33 and also comprising modulating said ultrasonic energy wherein said modulating provides a duty cycle between 1:10 and 1:20.

10 37. A method according to any of claims 34 to 36 and wherein said modulating provides between 2 and 1000 sequential cycles at an amplitude above a cavitation threshold.

15 38. A method according to any of claims 34 to 36 and wherein said modulating provides between 25 and 500 sequential cycles at an amplitude above a cavitation threshold.

20 39. A method according to any of claims 34 to 36 and wherein said modulating provides between 100 and 300 sequential cycles at an amplitude above a cavitation threshold.

40. A method according to any of claims 34 to 39 and wherein said modulating comprises modulating the amplitude of said ultrasonic energy over time.

25 41. A method for lysing cellulite comprising the steps of:
defining a region in a body at least partially by detecting spatial indications on said body;
directing ultrasonic energy at a multiplicity of target volumes containing cellulite within said region, thereby to selectively lyse said cellulite in said target
30 volumes and generally not lyse non-cellulite tissue in said target volumes.

42. A method for lysing cellulite according to claim 41 and wherein said

directing includes directing focused ultrasonic energy at said multiplicity of target volumes in a time sequence.

43. A method for lysing cellulite according to claim 41 and wherein said directing includes directing focused ultrasonic energy at plural ones of said multiplicity of target volumes for varying independent time periods.

44. A method for lysing cellulite according to claim 41 or claim 42 and wherein at least some of said multiplicity of target volumes at least partially overlap in space.

45. A method for lysing cellulite according to any of claims 41 to 44 and also comprising defining said region by marking at least one surface of said body.

46. A method for lysing cellulite according to claim 45 and also comprising defining said region by selecting at least one depth in said body.

47. A method for lysing cellulite according to claim 45 and also comprising defining said region by detecting cellulite in said body.

48. A method for lysing cellulite according to claim 47 and also comprising defining said region by detecting non-lysed cellulite.

49. A method for lysing cellulite according to claim 48 and wherein said directing also comprises defining said target volumes as unit volumes of non-lysed cellulite within said region.

50. A method for lysing cellulite according to claim 49 and also comprising modulating said ultrasonic energy so as to selectively lyse said cellulite in said multiplicity of target volumes, said modulating proceeding sequentially in time wherein selective lysis of cellulite in each of said target volumes takes place only following detection of non-lysed cellulite therein.

51. A method for lysing cellulite according to claim 47 and wherein said directing also comprises defining said target volumes as unit volumes of cellulite within said region.

52. A method for lysing cellulite according to claim 51 and also comprising modulating said ultrasonic energy so as to selectively lyse said cellulite in said multiplicity of target volumes, said modulating proceeding sequentially in time wherein selective lysis of cellulite in each of said target volumes takes place only following detection of cellulite therein.

53. A method for lysing cellulite according to any of claims 41 to 52 and also comprising computerized tracking of said multiplicity of target volumes notwithstanding movement of said body.

54. A method for lysing cellulite according to claim 53 and wherein said computerized tracking includes sensing changes in the position of markings on said body and employing sensed changes for tracking the positions of said target volumes in said body.

55. A method for lysing cellulite comprising the steps of:
directing ultrasonic energy at a multiplicity of target volumes containing cellulite within a region of a body, thereby to selectively lyse said cellulite in said multiplicity of target volumes and generally not lyse non-cellulite tissue in said multiplicity of target volumes; and
computerized tracking of said multiplicity of target volumes notwithstanding movement of said body.

56. A method for lysing cellulite according to claim 55 and wherein said computerized tracking includes sensing changes in the position of markings on said body and employing sensed changes for tracking the positions of said multiplicity of target volumes in said body.

57. Apparatus for lysing cellulite comprising:

a focused ultrasonic energy director, directing focused ultrasonic energy at a target volume in a region of a body containing cellulite ; and

5 a modulator, cooperating with said energy director to produce focused ultrasonic energy so as to selectively lyse said cellulite in said target volume and generally not lyse non-cellulite tissue in said target volume.

58. Apparatus for lysing cellulite according to claim 57 and wherein said

10 director is operative to generally prevent lysis of tissue outside of said target volume.

59. Apparatus for lysing cellulite according to claim 57 or claim 58 and also comprising:

15 an ultrasonic imager providing ultrasonic imaging of said region at least partially concurrently with said director directing said focused ultrasonic energy at said target volume.

60. Apparatus for lysing cellulite according to any of claims 57 to 59 and wherein said director comprises:

20 at least one ultrasonic transducer; and

a positioner, positioning said at least one ultrasonic transducer relative to said body.

61. Apparatus for lysing cellulite according to any of claims 57 to 59 and

25 wherein said director comprises:

at least one ultrasonic transducer; and

a focuser, varying the focus of said at least one ultrasonic transducer.

62. Apparatus for lysing cellulite according to claim 61 and wherein said

30 focuser is operative to change the volume of said target volume.

63. Apparatus for lysing cellulite according to claim 61 and wherein said

focuser is operative to change the distance of said target volume from said at least one ultrasonic transducer.

5 64. Apparatus for lysing cellulite according to any of claims 57 to 63 and also comprising a sensor, sensing ultrasonic energy coupled to an external surface of said body adjacent said target volume.

65. Apparatus for lysing cellulite according to any of claims 57 to 63 and
10 also comprising a sensor, sensing cavitation at said target volume.

66. Apparatus according to any of claims 57 to 65 and wherein said director comprises an ultrasonic transducer located outside of the body.

15 67. Apparatus according to any of claims 57 to 65 and wherein said target volume comprises a target volume bounded by dermis and facia.

68. Apparatus according to any of claims 57 to 67 and wherein said ultrasonic energy has a frequency in a range of 50 KHz - 1000 KHz.

20 69. Apparatus according to any of claims 57 to 67 and wherein said ultrasonic energy has a frequency in a range of 100 KHz - 500 KHz.

70. Apparatus according to any of claims 57 to 67 and wherein said
25 ultrasonic energy has a frequency in a range of 150 KHz - 300 KHz.

71. Apparatus according to any of claims 57 to 70 and wherein said modulator provides a duty cycle between 1:2 and 1:50.

30 72. Apparatus according to any of claims 57 to 70 and wherein said modulator provides a duty cycle between 1:5 and 1:30.

73. Apparatus according to any of claims 57 to 70 and wherein said modulator provides a duty cycle between 1:10 and 1:20.

74. Apparatus according to any of claims 57 to 73 and wherein said modulator provides between 2 and 1000 sequential cycles at an amplitude above a cavitation threshold.

75. Apparatus according to any of claims 57 to 73 and wherein said modulator provides between 25 and 500 sequential cycles at an amplitude above a cavitation threshold.

76. Apparatus according to any of claims 57 to 73 and wherein said modulator provides between 100 and 300 sequential cycles at an amplitude above a cavitation threshold.

77. Apparatus according to any of claims 57 to 76 and wherein said modulator is operative to modulate the amplitude of said ultrasonic energy over time.

78. Apparatus for lysing cellulite comprising:
a generator of ultrasonic energy located outside a body; and
an ultrasonic energy director, which employs said ultrasonic energy to selectively generally lyse cellulite and generally not lyse non-cellulite tissue in a target volume in a region of a body containing cellulite .

79. Apparatus for lysing cellulite according to claim 78 and wherein said director is operative to generally prevent lysis of tissue outside of said target volume.

80. Apparatus for lysing cellulite according to claim 78 or claim 79 and also comprising:

an ultrasonic imager, providing ultrasonic imaging of said region at least partially concurrently with the operation of said director.

81. Apparatus for lysing cellulite according to any of claims 78 to 80 and wherein said director comprises:

at least one ultrasonic transducer; and

a positioner, operative to position said at least one ultrasonic transducer relative to said body in order to direct said ultrasonic energy at said target volume.

82. Apparatus for lysing cellulite according to any of claims 78 to 80 and wherein said director comprises:

at least one ultrasonic transducer; and

a focuser, operative to vary the focus of said at least one ultrasonic transducer in order to direct said ultrasonic energy at said target volume.

83. Apparatus for lysing cellulite according to claim 82 and wherein said focuser is operative to change the volume of said target volume.

84. Apparatus for lysing cellulite according to claim 82 and wherein said focuser is operative to change the distance of said target volume from said at least one ultrasonic transducer.

85. Apparatus for lysing cellulite according to any of claims 78 to 84 and also comprising a sensor, sensing ultrasonic energy coupled to an external surface of said body adjacent said target volume.

86. Apparatus for lysing cellulite according to any of claims 78 to 84 and also comprising a sensor, sensing cavitation at said target volume.

87. Apparatus according to any of claims 78 to 86 and wherein said target volume comprises a target volume bounded by dermis and facia.

88. Apparatus according to any of claims 78 to 86 and wherein said ultrasonic energy has a frequency in a range of 50 KHz - 1000 KHz.

89. Apparatus according to any of claims 78 to 86 and wherein said ultrasonic energy has a frequency in a range of 100 KHz - 500 KHz.

90. Apparatus according to any of claims 78 to 86 and wherein said ultrasonic energy has a frequency in a range of 150 KHz - 300 KHz.

91. Apparatus according to any of claims 78 to 90 and also comprising a modulator wherein said modulator provides a duty cycle between 1:2 and 1:50.

92. Apparatus according to any of claims 78 to 90 and also comprising a modulator wherein said modulator provides a duty cycle between 1:5 and 1:30.

93. Apparatus according to any of claims 78 to 90 and also comprising a modulator wherein said modulator provides a duty cycle between 1:10 and 1:20.

94. Apparatus according to any of claims 91 to 93 and wherein said modulator provides between 2 and 1000 sequential cycles at an amplitude above a cavitation threshold.

95. Apparatus according to any of claims 91 to 93 and wherein said modulator provides between 25 and 500 sequential cycles at an amplitude above a cavitation threshold.

96. Apparatus according to any of claims 91 to 93 and wherein said modulator provides between 100 and 300 sequential cycles at an amplitude above a cavitation threshold.

97. Apparatus according to any of claims 91 to 96 and wherein said modulator is operative to modulate the amplitude of said ultrasonic energy over time.

98. Apparatus for lysing cellulite comprising:
a region definer, defining a region in a body at least partially by detecting

spatial indications on said body; and

an ultrasonic energy director, directing ultrasonic energy at a multiplicity of target volumes containing cellulite within said region, thereby to selectively lyse said cellulite in said multiplicity of target volumes and generally not lyse non-cellulite tissue in said multiplicity of target volumes.

99. Apparatus for lysing cellulite according to claim 98 and wherein said director directs focused ultrasonic energy at said multiplicity of target volumes in a time sequence.

100. Apparatus for lysing cellulite according to claim 98 and wherein said director directs focused ultrasonic energy at plural ones of said multiplicity of target volumes for varying independent time periods.

101. Apparatus for lysing cellulite according to any of claims 98 to 100 and wherein at least some of said multiplicity of target volumes at least partially overlaps in space.

102. Apparatus for lysing cellulite according to any of claims 98 to 101 and wherein said definer is operative to place at least one mark on at least one surface of said body.

103. Apparatus for lysing cellulite according to claim 102 and wherein said definer is operative to select at least one depth in said body.

104. Apparatus for lysing cellulite according to claim 102 and wherein said definer detects cellulite in said body.

105. Apparatus for lysing cellulite according to claim 104 and wherein said definer defines said region at least partially by detecting non-lysed cellulite.

106. Apparatus for lysing cellulite according to claim 105 and wherein said

director also defines said multiplicity of target volumes as unit volumes of non-lysed cellulite within said region.

107. Apparatus for lysing cellulite according to claim 106 and wherein said
5 director proceeds sequentially in time wherein selective lysis of cellulite in each of said multiplicity of target volumes takes place only following detection of non-lysed cellulite therein.

108. Apparatus for lysing cellulite according to claim 107 and wherein said
10 director also defines said multiplicity of target volumes as unit volumes of cellulite within said region.

109. Apparatus for lysing cellulite according to claim 108 and wherein said
15 director proceeds sequentially in time wherein selective lysis of cellulite in each of said multiplicity of target volumes takes place only following detection of cellulite therein.

110. Apparatus for lysing cellulite according to any of claims 98 to 109 and
also comprising a computerized tracking functionality providing computerized tracking
of said multiplicity of target volumes notwithstanding movement of said body.

20 111. Apparatus for lysing cellulite according to claim 110 and wherein said computerized tracking functionality is operative to sense changes in the position of markings on said body and to employ sensed changes for tracking the positions of said target volumes in said body.

25 112. Apparatus for lysing cellulite comprising:
an ultrasonic energy director, directing ultrasonic energy at a multiplicity
of target volumes containing cellulite within a region of a body, thereby to selectively
lyse said cellulite in said multiplicity of target volumes and generally not lyse
30 non-cellulite tissue in said multiplicity of target volumes; and
a computerized tracking functionality providing computerized tracking
of said multiplicity of target volumes notwithstanding movement of said body.

113. Apparatus for lysing cellulite according to claim 112 and wherein said computerized tracking functionality is operative to sense changes in the position of markings on said body and to employ sensed changes for tracking the positions of said target volumes in said body.

114. A method for inducing apoptosis in cellulite and fat comprising the steps of:

directing focused ultrasonic energy at a target volume in a region of a body containing cellulite and fat ; and

modulating said focused ultrasonic energy so as to selectively induce apoptosis in said cellulite and fat in said target volume and generally not induce apoptosis in non-cellulite and non-fat tissue in said target volume.

115. A method for inducing apoptosis in cellulite and fat according to claim 114 and wherein said directing focused ultrasonic energy generally prevents apoptosis of tissue outside of said target volume.

116. A method for inducing apoptosis in cellulite and fat according to claim 114 or claim 115 and also comprising:

ultrasonic imaging of said region at least partially concurrently with said directing focused ultrasonic energy at said target volume.

117. A method for inducing apoptosis in cellulite and fat according to any of claims 114 to 116 and wherein said directing comprises positioning at least one ultrasonic transducer relative to said body in order to direct said focused ultrasonic energy at said target volume.

118. A method for inducing apoptosis in cellulite and fat according to any of claims 114 to 116 and wherein said directing comprises varying the focus of at least one ultrasonic transducer in order to direct said focused ultrasonic energy at said target volume.

119. A method for inducing apoptosis in cellulite and fat according to claim 118 and wherein varying the focus changes the volume of said target volume.

5 120. A method for inducing apoptosis in cellulite and fat according to claim 118 and wherein varying the focus changes the distance of said target volume from said at least one ultrasonic transducer.

10 121. A method for inducing apoptosis in cellulite and fat according to any of claims 114 to 120 and also comprising sensing ultrasonic energy coupled to an external surface of said body adjacent said target volume.

122. A method for inducing apoptosis in cellulite and fat according to any of claims 114 to 121 and also comprising sensing of cavitation at said target volume.

15 123. A method according to any of claims 114 to 121 and wherein said directing takes place from an ultrasonic transducer located outside of the body.

20 124. A method according to any of claims 114 to 121 and wherein said directing takes place to a target volume bounded by dermis and fascia.

125. A method according to any of claims 114 to 124 and wherein said ultrasonic energy has a frequency in a range of 50 KHz - 1000 KHz.

25 126. A method according to any of claims 114 to 124 and wherein said ultrasonic energy has a frequency in a range of 100 KHz - 500 KHz.

127. A method according to any of claims 114 to 124 and wherein said ultrasonic energy has a frequency in a range of 150 KHz - 300 KHz.

30 128. A method according to any of claims 114 to 127 and wherein said modulating provides a duty cycle between 1:2 and 1:50.

129. A method according to any of claims 114 to 128 and wherein said modulating provides a duty cycle between 1:5 and 1:30.

5 130. A method according to any of claims 114 to 129 and wherein said modulating provides a duty cycle between 1:10 and 1:20.

131. A method according to any of claims 114 to 130 and wherein said modulating provides between 2 and 1000 sequential cycles at amplitude above a
10 cavitation threshold.

132. A method according to any of claims 114 to 131 and wherein said modulating provides between 25 and 500 sequential cycles at amplitude above a cavitation threshold.

15 133. A method according to any of claims 114 to 132 and wherein said modulating provides between 100 and 300 sequential cycles at amplitude above a cavitation threshold.

20 134. A method according to any of claims 114 to 133 and wherein said modulating comprises modulating the amplitude of said ultrasonic energy over time.

135. A method for inducing apoptosis in cellulite and fat comprising the steps of:

25 generating, at a source outside a body, ultrasonic energy which selectively generally induces apoptosis in cellulite and fat and generally does not induce apoptosis in non-cellulite and non-fat tissue; and

directing said ultrasonic energy, from said source outside said body, at a target volume in a region of a body containing cellulite and fat.

30 136. A method for inducing apoptosis in cellulite and fat according to claim 135 and wherein said directing said ultrasonic energy generally prevents induction of

apoptosis of tissue outside of said target volume.

137. A method for inducing apoptosis in cellulite and fat according to claim 135 or claim 136 and also comprising:

5 ultrasonic imaging of said region at least partially concurrently with said directing said ultrasonic energy at said target volume.

138. A method for inducing apoptosis in cellulite and fat according to any of claims 135 to 137 and wherein said directing comprises positioning at least one
10 ultrasonic transducer relative to said body in order to direct said ultrasonic energy at said target volume.

139. A method for inducing apoptosis in cellulite and fat according to any of claims 135 to 137 and wherein said directing comprises varying the focus of at least one
15 ultrasonic transducer in order to direct said focused ultrasonic energy at said target volume.

140. A method for inducing apoptosis in cellulite and fat according to claim 139 and wherein varying the focus comprises changing the volume of said target
20 volume.

141. A method for inducing apoptosis in cellulite and fat according to claim 139 and wherein varying the focus comprises changing the distance of said target volume from said at least one ultrasonic transducer.
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142. A method for inducing apoptosis in cellulite and fat according to any of claims 135 to 141 and also comprising sensing ultrasonic energy coupled to an external surface of said body adjacent said target volume.

30 143. A method for inducing apoptosis in cellulite and fat according to any of claims 135 to 141 and also comprising sensing of cavitation at said target volume.

144. A method according to any of claims 135 to 143 and wherein said ultrasonic energy has a frequency in a range of 50 KHz - 1000 KHz.

145. A method according to any of claims 135 to 143 and wherein said ultrasonic energy has a frequency in a range of 100 KHz - 500 KHz.

146. A method according to any of claims 135 to 143 and wherein said ultrasonic energy has a frequency in a range of 150 KHz - 300 KHz.

147. A method according to any of claims 135 to 146 and also comprising modulating said ultrasonic energy wherein said modulating provides a duty cycle between 1:2 and 1:50.

148. A method according to any of claims 135 to 147 and also comprising modulating said ultrasonic energy wherein said modulating provides a duty cycle between 1:5 and 1:30.

149. A method according to any of claims 135 to 148 and also comprising modulating said ultrasonic energy wherein said modulating provides a duty cycle between 1:10 and 1:20.

150. A method according to any of claims 147 to 149 and wherein said modulating provides between 2 and 1000 sequential cycles at an amplitude above a cavitation threshold.

151. A method according to any of claims 147 to 149 and wherein said modulating provides between 25 and 500 sequential cycles at an amplitude above a cavitation threshold.

152. A method according to any of claims 147 to 149 and wherein said modulating provides between 100 and 300 sequential cycles at an amplitude above a cavitation threshold.

153. A method according to any of claims 147 to 152 and wherein said modulating comprises modulating the amplitude of said ultrasonic energy over time.

5 154. A method for inducing apoptosis in cellulite and fat comprising the steps of:

defining a region in a body at least partially by detecting spatial indications on said body; and

10 directing ultrasonic energy at a multiplicity of target volumes containing cellulite and fat within said region, thereby to selectively induce apoptosis in said cellulite and fat in said target volumes and generally not induce apoptosis in non-cellulite and non-fat tissue in said target volumes.

15 155. A method for inducing apoptosis in cellulite and fat according to claim 154 and wherein said directing includes directing focused ultrasonic energy at said multiplicity of target volumes in a time sequence.

20 156. A method for inducing apoptosis in cellulite and fat according to claim 154 and wherein said directing includes directing focused ultrasonic energy at plural ones of said multiplicity of target volumes for varying independent time periods.

25 157. A method for inducing apoptosis in cellulite and fat according to claim 154 or claim 155 and wherein at least some of said multiplicity of target volumes at least partially overlap in space.

158. A method for inducing apoptosis in cellulite and fat according to any of claims 154 to 157 and also comprising defining said region by marking at least one surface of said body.

30 159. A method for inducing apoptosis in cellulite and fat according to any of claims 154 to 158 and also comprising defining said region by selecting at least one depth in said body.

160. A method for inducing apoptosis in cellulite and fat according to any of claims 154 to 158 and also comprising defining said region by detecting cellulite and fat in said body.

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161. A method for inducing apoptosis in cellulite and fat according to any of claims 154 to 160 and also comprising defining said region by detecting non-apoptotic induced cellulite and fat.

10 162. A method for inducing apoptosis in cellulite and fat according to any of claims 154 to 161 and wherein said directing also comprises defining said target volumes as unit volumes of non-apoptotic induced cellulite and fat within said region.

15 163. A method for inducing apoptosis in cellulite and fat according to any of claims 154 to 162 and also comprising modulating said ultrasonic energy so as to selectively induce apoptosis in said cellulite and fat in said multiplicity of target volumes, said modulating proceeding sequentially in time wherein selective induction of apoptosis of cellulite and fat in each target volume takes place only following detection of non-apoptotic induced cellulite and fat therein.

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164. A method for inducing apoptosis in cellulite and fat according to any of claims 154 to 163 and wherein said directing also comprises defining said target volumes as unit volumes of cellulite and fat within said region.

25 165. A method for inducing apoptosis in cellulite and fat according to any of claims 154 to 164 and also comprising modulating said ultrasonic energy so as to selectively induce apoptosis in said cellulite and fat in said multiplicity of target volumes, said modulating proceeding sequentially in time wherein selective induction of apoptosis of cellulite and fat in each target volume takes place only following
30 detection of cellulite and fat therein.

166. A method for inducing apoptosis in cellulite and fat according to any of

claims 154 to 165 and also comprising computerized tracking of said multiplicity of target volumes notwithstanding movement of said body.

167. A method for inducing apoptosis in cellulite and fat according to any of
5 claims 154 to 166 and wherein said computerized tracking includes sensing changes in the position of markings on said body and employing sensed changes for tracking the positions of said target volumes in said body.

168. A method for inducing apoptosis in cellulite and fat comprising the steps
10 of:

directing ultrasonic energy at a multiplicity of target volumes containing cellulite and fat within a region of a body, thereby to selectively induce apoptosis in said cellulite and fat in said multiplicity of target volumes and generally not induce apoptosis in non-cellulite and non-fat tissue in said multiplicity of target volumes; and

15 computerized tracking of said multiplicity of target volumes notwithstanding movement of said body.

169. A method for inducing apoptosis in cellulite and fat according to claim
20 168 and wherein said computerized tracking includes sensing changes in the position of markings on said body and employing sensed changes for tracking the positions of said target volumes in said body.

170. Apparatus for inducing apoptosis in cellulite and fat comprising:
a focused ultrasonic energy director, directing focused ultrasonic energy
25 at a target volume in a region of a body containing cellulite and fat; and
a modulator, cooperating with said energy director to produce focused ultrasonic energy so as to selectively induce apoptosis in said cellulite and fat in said target volume and generally not induce apoptosis in non-cellulite and non-fat tissue in said target volume.

30 171. Apparatus for inducing apoptosis in cellulite and fat according to claim 170 and wherein said director is operative to generally prevent induction of apoptosis of

tissue outside of said target volume.

172. Apparatus for inducing apoptosis in cellulite and fat according to claim 170 or claim 171 and also comprising:

5 an ultrasonic imager providing ultrasonic imaging of said region at least partially concurrently with said director directing said focused ultrasonic energy at said target volume.

173. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 170 to 172 and wherein said director comprises:

10 at least one ultrasonic transducer; and
a positioner, positioning said at least one ultrasonic transducer relative to said body.

174. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 170 to 172 and wherein said director comprises:

at least one ultrasonic transducer; and
a focuser, varying the focus of said at least one ultrasonic transducer.

175. Apparatus for inducing apoptosis in cellulite and fat according to claim 174 and wherein said focuser is operative to change the volume of said target volume.

176. Apparatus for inducing apoptosis in cellulite and fat according to claim 174 and wherein said focuser is operative to change the distance of said target volume from said at least one ultrasonic transducer.

177. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 170 to 176 and also comprising a sensor, sensing ultrasonic energy, coupled to an external surface of said body adjacent said target volume.

178. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 170 to 176 and also comprising a sensor, sensing cavitation at said target

volume.

179. Apparatus according to any of claims 170 to 178 and wherein said director comprises an ultrasonic transducer located outside of the body.

180. Apparatus according to any of claims 170 to 178 and wherein said target volume comprises a target volume bounded by dermis and facia.

181. Apparatus according to any of claims 170 to 180 and wherein said ultrasonic energy has a frequency in a range of 50 KHz - 1000 KHz.

182. Apparatus according to any of claims 170 to 180 and wherein said ultrasonic energy has a frequency in a range of 100 KHz - 500 KHz.

183. Apparatus according to any of claims 170 to 180 and wherein said ultrasonic energy has a frequency in a range of 150 KHz - 300 KHz.

184. Apparatus according to any of claims 170 to 183 and wherein said modulator provides a duty cycle between 1:2 and 1:50.

185. Apparatus according to any of claims 170 to 183 and wherein said modulator provides a duty cycle between 1:5 and 1:30.

186. Apparatus according to any of claims 170 to 183 and wherein said modulator provides a duty cycle between 1:10 and 1:20.

187. Apparatus according to any of claims 170 to 186 and wherein said modulator provides between 2 and 1000 sequential cycles at an amplitude above a cavitation threshold.

188. Apparatus according to any of claims 170 to 186 and wherein said modulator provides between 25 and 500 sequential cycles at an amplitude above a

cavitation threshold.

189. Apparatus according to any of claims 170 to 188 and wherein said modulator provides between 100 and 300 sequential cycles at an amplitude above a cavitation threshold.

190. Apparatus according to any of claims 170 to 189 and comprising a modulator operative to modulate the amplitude of said ultrasonic energy over time.

191. Apparatus for inducing apoptosis in cellulite and fat comprising:
a generator of ultrasonic energy located outside a body; and
an ultrasonic energy director, which employs said ultrasonic energy to selectively generally induce apoptosis in cellulite and fat and generally not induce apoptosis in non-cellulite and non-fat tissue in a target volume in a region of a body containing cellulite and fat.

192. Apparatus for inducing apoptosis in cellulite and fat according to claim 191 and wherein said director is operative to generally prevent induction of apoptosis of tissue outside of said target volume.

193. Apparatus for inducing apoptosis in cellulite and fat according to claim 191 or claim 192 and also comprising:
an ultrasonic imager, providing ultrasonic imaging of said region at least partially concurrently with the operation of said director.

194. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 191 to 193 and wherein said director comprises:
at least one ultrasonic transducer; and
a positioner, operative to position said at least one ultrasonic transducer relative to said body in order to direct said ultrasonic energy at said target volume.

195. Apparatus for inducing apoptosis in cellulite and fat according to any of

claims 191 to 193 and wherein said director comprises:

at least one ultrasonic transducer; and

a focuser, operative to vary the focus of said at least one ultrasonic transducer in order to direct said ultrasonic energy at said target volume.

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196. Apparatus for inducing apoptosis in cellulite and fat according to claim 193 and wherein said focuser is operative to change the volume of said target volume.

197. Apparatus for inducing apoptosis in cellulite and fat according to claim 191 and wherein said focuser is operative to change the distance of said target volume from said at least one ultrasonic transducer.

198. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 191 to 197 and also comprising a sensor, sensing ultrasonic energy coupled to an external surface of said body adjacent said target volume.

199. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 191 to 197 and also comprising a sensor, sensing cavitation at said target volume.

200. Apparatus according to any of claims 191 to 199 and wherein said target volume comprises a target volume bounded by dermis and facia.

201. Apparatus according to any of claims 191 to 199 and wherein said ultrasonic energy has a frequency in a range of 50 KHz - 1000 KHz.

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202. Apparatus according to any of claims 191 to 199 and wherein said ultrasonic energy has a frequency in a range of 100 KHz - 500 KHz.

203. Apparatus according to any of claims 191 to 199 and wherein said ultrasonic energy has a frequency in a range of 150 KHz - 300 KHz.

204. Apparatus according to any of claims 191 to 203 and also comprising a

modulator wherein said modulator provides a duty cycle between 1:2 and 1:50.

205. Apparatus according to any of claims 191 to 203 and also comprising a modulator wherein said modulator provides a duty cycle between 1:5 and 1:30.

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206. Apparatus according to any of claims 191 to 203 and also comprising a modulator wherein said modulator provides a duty cycle between 1:10 and 1:20.

207. Apparatus according to any of claims 204 to 206 and wherein said modulator provides between 2 and 1000 sequential cycles at an amplitude above a cavitation threshold.

208. Apparatus according to any of claims 204 to 206 and wherein said modulator provides between 25 and 500 sequential cycles at an amplitude above a cavitation threshold.

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209. Apparatus according to any of claims 204 to 206 and wherein said modulator provides between 100 and 300 sequential cycles at an amplitude above a cavitation threshold.

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210. Apparatus according to any of claims 204 to 209 and wherein said modulator is operative to modulate the amplitude of said ultrasonic energy over time.

211. Apparatus for inducing apoptosis in cellulite and fat comprising:

25 a region definer, defining a region in a body at least partially by detecting spatial indications on said body; and

a director, directing ultrasonic energy at a multiplicity of target volumes containing cellulite and fat within said region, thereby to selectively induce apoptosis in said cellulite and fat in said multiplicity of target volumes and generally not induce apoptosis in non-cellulite and non-fat tissue in said multiplicity of target volumes.

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212. Apparatus for inducing apoptosis in cellulite and fat according to claim

211 and wherein said director directs focused ultrasonic energy at said multiplicity of target volumes in a time sequence.

213. Apparatus for inducing apoptosis in cellulite and fat according to claim
5 211 and wherein said director directs focused ultrasonic energy at plural ones of said multiplicity of target volumes for varying independent time periods.

214. Apparatus for inducing apoptosis in cellulite and fat according to any of
10 claims 211 to 213 and wherein at least some of said multiplicity of target volumes at least partially overlaps in space.

215. Apparatus for inducing apoptosis in cellulite and fat according to any of
15 claims 211 to 213 and wherein said definer is operative to place at least one mark on at least one surface of said body.

216. Apparatus for inducing apoptosis in cellulite and fat according to any of
claims 211 to 215 and wherein said definer is operative to select at least one depth in said body.

20 217. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 211 to 215 and wherein said definer detects cellulite and fat in said body.

218. Apparatus for inducing apoptosis in cellulite and fat according to any of
25 claims 211 to 217 and wherein said definer defines said region at least partially by detecting non-apoptotic induced cellulite and fat.

219. Apparatus for inducing apoptosis in cellulite and fat according to any of
30 claims 211 to 218 and wherein said director also defines said multiplicity of target volumes as unit volumes of non-apoptotic induced cellulite and fat within said region.

220. Apparatus for inducing apoptosis in cellulite and fat according to any of
claims 211 to 219 and wherein said director proceeds sequentially in time wherein

selective induction of apoptosis of cellulite and fat in each of said multiplicity of target volumes takes place only following detection of non-apoptotic induced cellulite and fat therein.

5 221. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 211 to 219 and wherein said director also defines said multiplicity of target volumes as unit volumes of cellulite and fat within said region.

10 222. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 211 to 221 and wherein said director proceeds sequentially in time wherein selective induction of apoptosis of cellulite and fat in each of said multiplicity of target volumes takes place only following detection of cellulite and fat therein.

15 223. Apparatus for inducing apoptosis in cellulite and fat according to any of claims 211 to 222 and also comprising a computerized tracking functionality providing computerized tracking of said multiplicity of target volumes notwithstanding movement of said body.

20 224. Apparatus for inducing apoptosis in cellulite and fat according to claim 223 and wherein said computerized tracking functionality is operative to sense changes in the position of markings on said body and to employ sensed changes for tracking the positions of said multiplicity of target volumes in said body.

25 225. Apparatus for inducing apoptosis in cellulite and fat comprising:
a director, directing ultrasonic energy at a multiplicity of target volumes containing cellulite and fat within a region of a body, thereby to selectively induce apoptosis in said cellulite and fat in said multiplicity of target volumes and generally not induce apoptosis in non-cellulite and non-fat tissue in said multiplicity of target volumes; and
30 a computerized tracking functionality providing computerized tracking of said multiplicity of target volumes notwithstanding movement of said body.

226. Apparatus for inducing apoptosis in cellulite and fat according to claim 225 and wherein said computerized tracking functionality is operative to sense changes in the position of markings on said body and to employ sensed changes for tracking the positions of said target volumes in said body.

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227. A method for medical treatment comprising the steps of:
defining in real-time a region of a body and at least one target volume therein, the three-dimensional configuration of said region and the location of said at least one target volume being variable over time during said medical treatment, at least partially by detecting at least one spatial indication on said region;

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detecting in real-time the location and orientation of a selectably positionable energy director relative to said region and relative to said at least one target volume, at least partially by detecting at least one spatial indicator on said energy director; and

directing energy from said energy director to said at least one target volume only when the location and orientation of said energy director relative to said at least one target volume are within predetermined limits.

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228. A method for medical treatment according to claim 227 and also including:

20 imaging of said body region at least partially concurrently with said directing energy at said at least one target volume.

229. A method for medical treatment according to claims 227 or 228 and also comprising:

25 defining said at least one spatial indication at least partly by drawing on the body with a visible marker.

230. A method for medical treatment according to claims 227 or 228 and also comprising:

30 defining said at least one spatial indication at least partly by using a virtual marker.

231. A method for medical treatment according to claims 227 or 228 wherein said detecting at least one spatial indication comprises detecting at least one physical marker on said region.

5 232. A method for medical treatment according to claims 227 or 228 wherein said detecting at least one spatial indication comprises detecting at least one partly anatomical marker.

233. A method for medical treatment according to claims 227 or 228 wherein
10 said detecting at least one spatial indication comprises detecting at least one marker at least partly adhered to the body.

234. A method for medical treatment according to claim 231 wherein said
15 detecting at least one spatial indication comprises detecting at least one virtual marker.

235. A method for medical treatment according to any of claims 227 to 234
wherein said detecting comprises optical detecting.

236. A method for medical treatment according to any of claims 227 to 234
20 wherein said detecting comprises ultrasonic detecting.

237. A method for medical treatment according to any of claims 227 to 236
and also comprising at least partly manually moving said energy director on said body.

25 238. A method for medical treatment according to any of claims 227 to 236
and also comprising mechanically moving said energy director on said body.

239. A method for medical treatment according to any of claims 227 to 238
and also comprising directing ultrasonic energy at said at least one target volume.

30 240. A method for medical treatment according to any of claims 227 to 238
and also comprising directing electromagnetic energy at said at least one target volume.

241. A system for medical treatment comprising:
a selectably positionable energy director;
a real-time tracking subsystem comprising:

5 a real-time body region definer, defining in real time a region of a body and at least one target volume therein, the three-dimensional configuration of said region and the location of said at least one target volume being variable over time during said medical treatment, at least partially by detecting at least one spatial indication on said region; and

10 a real-time energy director detector, detecting in real time the location and orientation of said energy director relative to said region and relative to said at least one target volume, at least partially by detecting at least one spatial indicator on said energy director; and

15 a treatment subsystem, directing energy from said energy director to said at least one target volume only when the location and orientation of said energy director relative to said at least one target volume are within predetermined limits.

242. A system for medical treatment according to claim 241 and also including:

20 an imaging subsystem, imaging said region at least partially concurrent with the operation of said treatment subsystem.

243. A system for medical treatment according to claims 241 or 242 wherein said at least one spatial indication comprises at least one visible mark drawn on said
25 body.

244. A system for medical treatment according to claims 241 or 242 wherein said at least one spatial indication comprises at least one virtual mark.

30 245. A system for medical treatment according to any of claims 241 to 244 wherein body region definer detects physical markers on said body.

246. A system for medical treatment according to claim 245 wherein said markers comprise anatomical markers at least partly anatomical markers.

247. A system for medical treatment according to claim 245 wherein said markers comprise markers at least partly adhered to the body.

248. A system for medical treatment according to claim 245 wherein said markers comprise virtual markers.

249. A system for medical treatment according to any of claims 241 to 248 wherein said detector comprises an optical detector.

250. A system for medical treatment according to any of claims 241 to 248 wherein said detector comprises an ultrasonic detector.

251. A system for medical treatment according to any of claims 241 to 250 wherein said energy director is at least partly moved manually on said body.

252. A system for medical treatment according to any of claims 241 to 250 wherein said energy director is moved mechanically on said body

253. A system for medical treatment according to any of claims 241 to 252 wherein said energy director directs ultrasonic energy at said at least one target volume.

254. A system for medical treatment according to any of claims 241 to 252 wherein said energy director directs electromagnetic energy at said at least one target volume.

255. A method for medical diagnosis comprising the steps of:
defining in real-time a region of a body and at least one target volume therein, the three-dimensional configuration of said region and the location of said at least one target volume being variable over time during said medical diagnosis, at least

partially by detecting at least one spatial indication on said region;

detecting in real-time the location and orientation of a selectably positionable diagnosis detector relative to said body region and relative to said at least one target volume, at least partially by detecting at least one spatial indicator on said diagnosis detector; and

directing energy from said diagnosis detector to said at least one target volume and from said at least one target volume to said diagnosis detector only when the location and orientation of said diagnosis detector relative to said at least one target volume are within predetermined limits.

256. A method for medical diagnosis according to claim 255 and also including:

imaging of said body region at least partially concurrently with said directing energy at said at least one target volume.

257. A method for medical diagnosis according to claims 255 or 256 also comprising:

defining said at least one spatial indication at least partly by drawing on the body with a visible marker.

258. A method for medical diagnosis according to claims 255 to 256 and also comprising:

defining said at least one spatial indication at least partly by using a virtual marker .

259. A method for medical diagnosis according to claims 255 or 256 wherein said detecting at least one spatial indication comprises detecting at least one physical marker on said body region.

260. A method for medical diagnosis according to claims 255 or 256 wherein detecting at least one spatial indication comprises detecting at least one partly anatomical marker.

261. A method for medical diagnosis according to claims 255 or 256 wherein said detecting at least one spatial indication comprises detecting at least one marker partly adhered to the body.

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262. A method for medical diagnosis according to claims 255 or 256 wherein said detecting at least one spatial indication comprises detecting at least one virtual marker.

10 263. A method for medical diagnosis according to any of claims 255 to 262 wherein said detecting comprises optical detecting.

264. A method for medical diagnosis according to any of claims 255 to 262 wherein said detecting comprises ultrasonic detecting.

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265. A method for medical diagnosis according to any of claims 255 to 264 and also comprising at least partly manually moving said diagnosis detector on said body.

20 266. A method for medical diagnosis according to any of claims 255 to 264 and also comprising mechanically moving said diagnosis detector on said body.

267. A method for medical diagnosis according to any of claims 255 to 262 wherein said directing energy comprises directing ultrasonic energy.

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268. A method for medical diagnosis according to any of claims 255 to 262 wherein said directing energy comprises directing electromagnetic energy.

269. A system for medical diagnosis comprising:

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a selectably positionable diagnosis detector;

a real-time tracking subsystem comprising:

a real-time body region definer, defining in real time a region of a

body and at least one target volume therein, the three-dimensional configuration of said region and the location of said at least one target volume being variable over time during said medical diagnosis, at least partially by detecting at least one spatial indication on said region; and

5 a real-time diagnosis detector tracker, detecting in real time the location and orientation of said diagnosis detector relative to said region and relative to said at least one target volume, at least partially by detecting at least one spatial indicator on said diagnosis detector; and

10 a diagnosis subsystem, directing energy from said diagnostic detector to said at least one target volume and from said at least one target volume to said diagnostic detector only when the location and orientation of said diagnostic detector to said at least one target volume are within predetermined limits.

270. A system for medical diagnosis according to claim 269 and also
15 including:

 an imaging subsystem, imaging said region at least partially concurrent with the operation of said diagnosis subsystem.

271. A system for medical diagnosis according to claims 269 or 270 wherein
20 said at least one spatial indication comprises at least one visible mark drawn on said body.

272. A system for medical diagnosis according to claims 269 or 270 wherein
25 said at least one spatial indication comprises at least one virtual mark.

273. A system for medical diagnosis according to any of claims 269 to 272
wherein said body region definer detects physical markers on said body.

274. A system for medical diagnosis according to claim 273 wherein said
30 markers comprise at least partly anatomical markers.

275. A system for medical diagnosis according to claim 273 wherein said

markers comprise markers are at least partly adhered to the body.

276. A system for medical diagnosis according to claim 273 wherein said markers comprise virtual markers.

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277. A system for medical diagnosis according to any of claims 269 to 276 wherein said diagnostic detector employs an optic detector.

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278. A system for medical diagnosis according to any of claims 269 to 276 wherein said diagnostic detector comprises an ultrasonic detector.

279. A system for medical diagnosis according to any of claims 269 to 278 wherein said diagnostic detector is at least partly moved manually on said body.

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280. A system for medical diagnosis according to claims 269 to 279 wherein said diagnostic detector is moved mechanically on said body.

281. A system for medical diagnosis according to claims 269 to 279 wherein said diagnostic detector employs ultrasonic energy.

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282. A system for medical diagnosis according to claim 269 to 279 wherein said diagnostic detector employs electromagnetic energy.

283. Apparatus for ultrasonic therapy comprising:
25 an ultrasonic energy director assembly comprising a plurality of Langevin ultrasonic transducers coupled together to provide focused ultrasonic energy on a target volume.

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284. Apparatus for ultrasonic therapy according to claim 283 and wherein each of said plurality of Langevin ultrasonic transducers comprises:
a pair of piezoelectric elements separated by a positive contact electrode;
and

negative contact electrodes located on both sides of the pair of piezoelectric elements and held tightly against the pair of piezoelectric elements by a bolt and nut.

5 285. Apparatus for ultrasonic therapy according to claims 283 or 284 and wherein said plurality of Langevin ultrasonic transducers are embedded in a vibration damping material to avoid mechanical cross talk therebetween.

286. Apparatus according to any of claims 283 to 285 and also comprising:
10 a cooling system associated with the plurality of Langevin ultrasonic transducers for cooling thereof.

287. Apparatus according to any of claims 283 to 286 and also comprising an intermediate element, having acoustic impedance similar to that of soft mammalian
15 tissue disposed between said plurality of Langevin ultrasonic transducers a contact surface for engagement with a body.